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Drumm

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[54] **STRIP BRUSH FOR MOUNTING ON A ROTARY DRUM**

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[21] Appl. No.: **958,799**

[22] Filed: **Oct. 9, 1992**

Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 777,905, Oct. 17, 1991, Pat. No. 5,160,187.

[51] **Int. Cl.**[5] **A46B 9/08**

[52] **U.S. Cl.** **15/182**; 15/183; 15/199

[58] **Field of Search** 300/21; 15/179, 182, 15/183, 199

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Assistant Examiner—Frances Chin
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[57] **ABSTRACT**

A bristle strip for rotary brushes comprising a supporting channel in which the closed ends of the U-shaped bristles are clamped. The channel is provided with laterally-extending guide members mounted directly thereon that project laterally outwardly beyond its side flanges to guide the strip when it is inserted in a guide track on a rotary drum and to retain it therein. Due to the simple nature of the strip it can be produced at a low cost without special tooling.

7 Claims, 7 Drawing Sheets

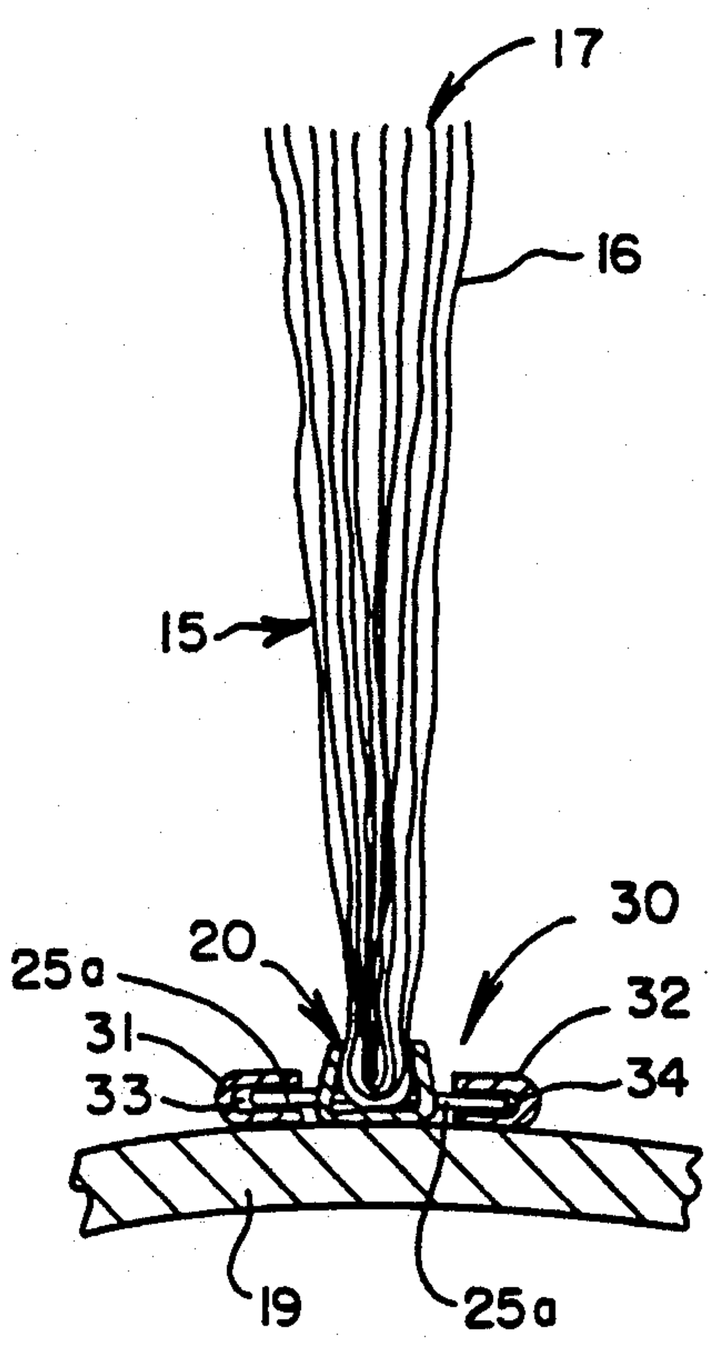
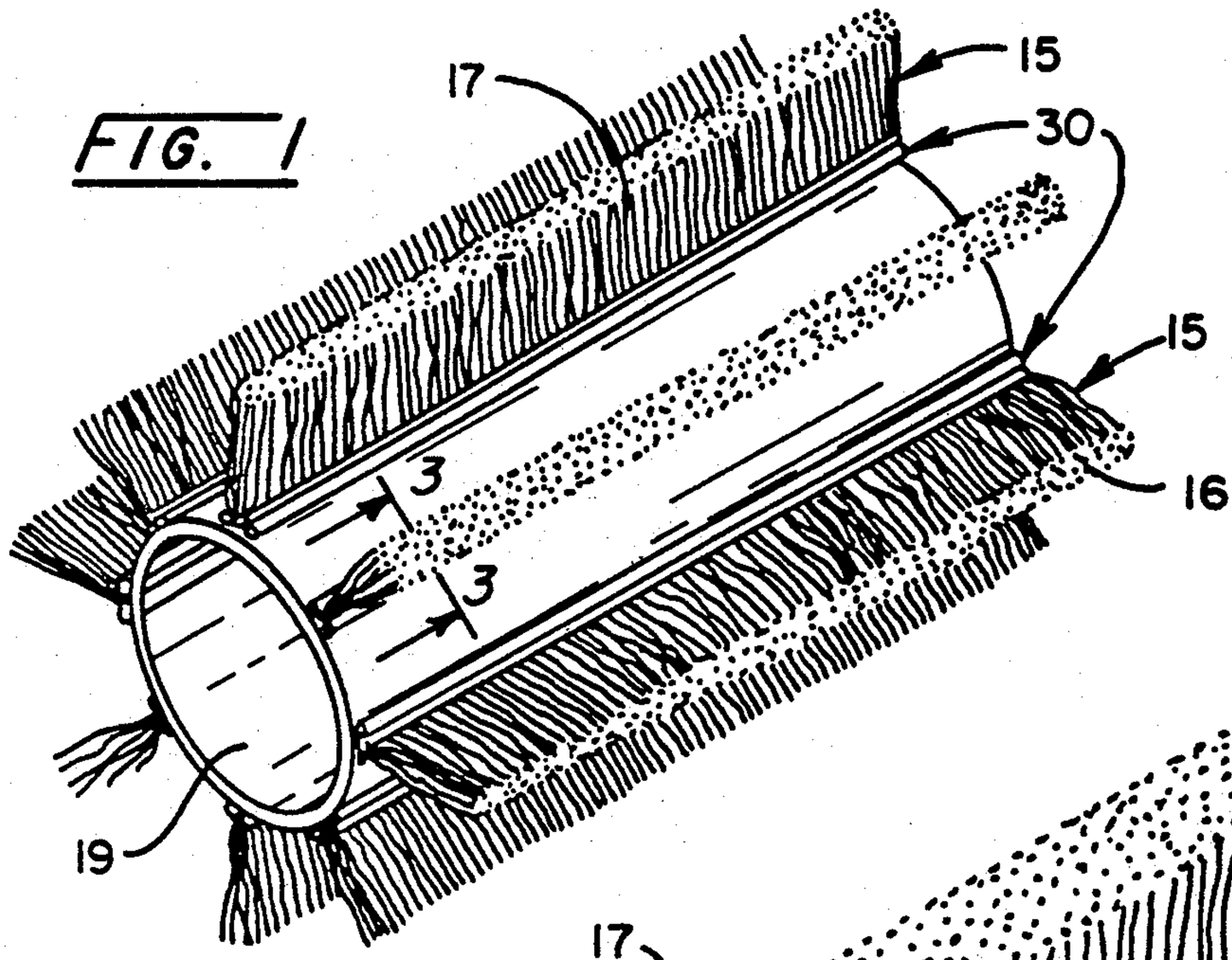


FIG. 1



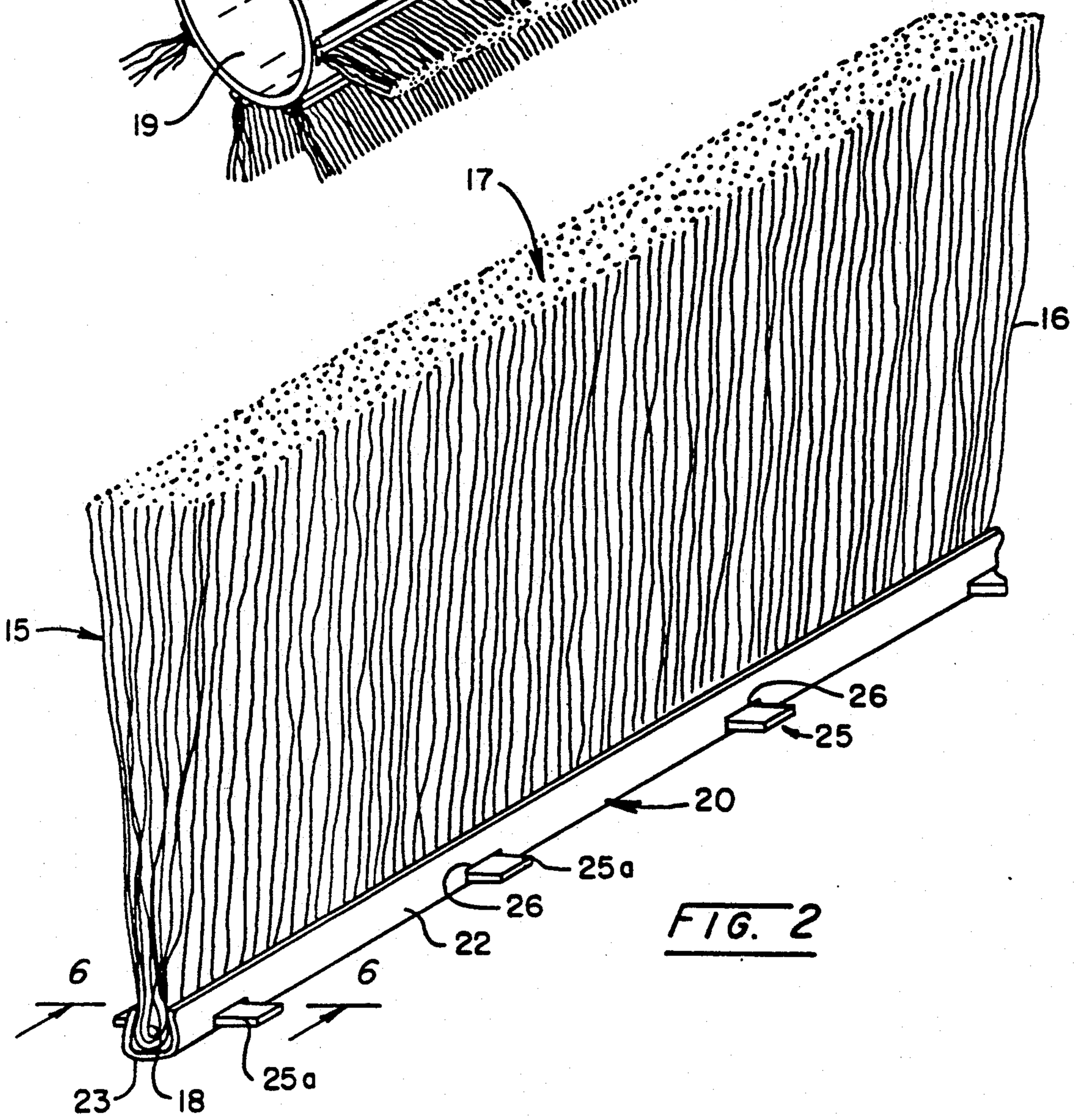


FIG. 2

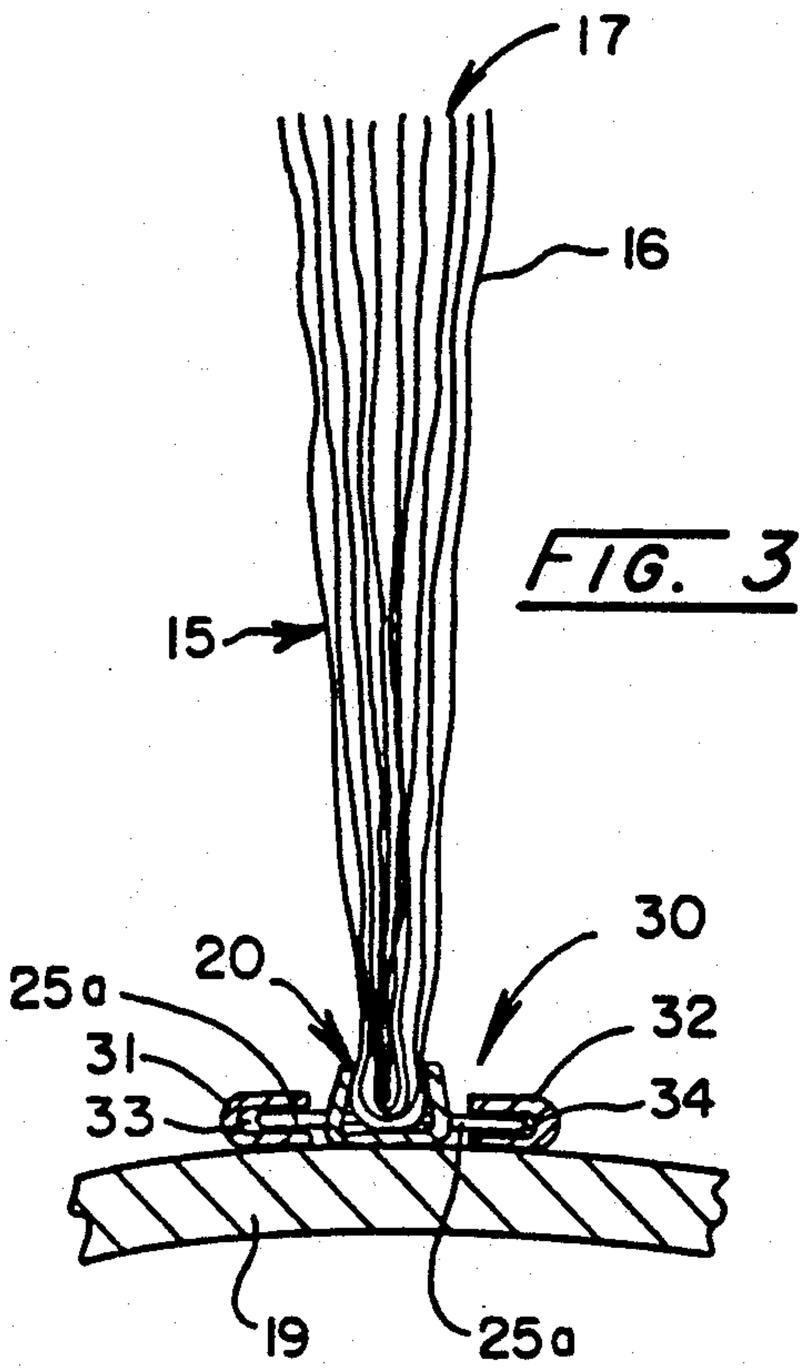


FIG. 3

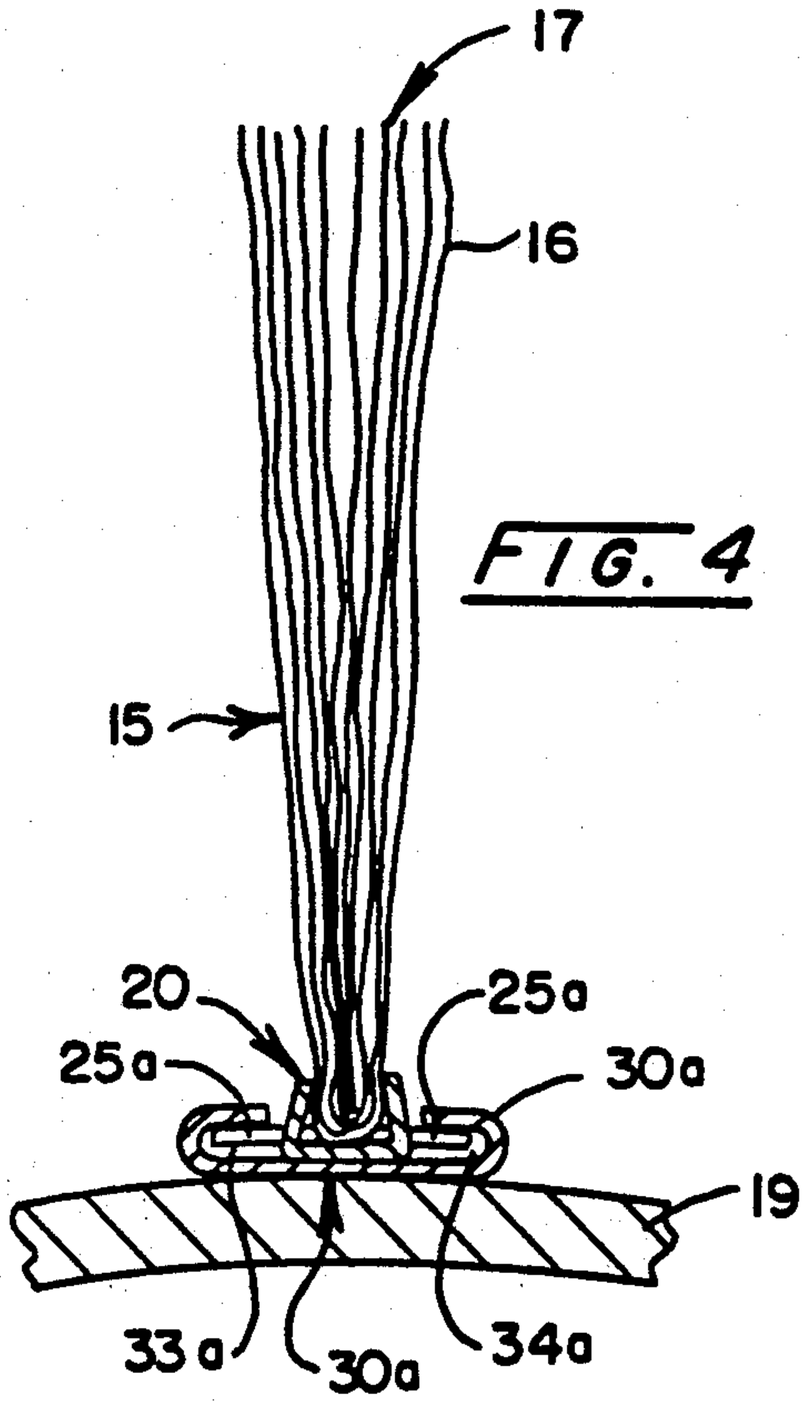


FIG. 4

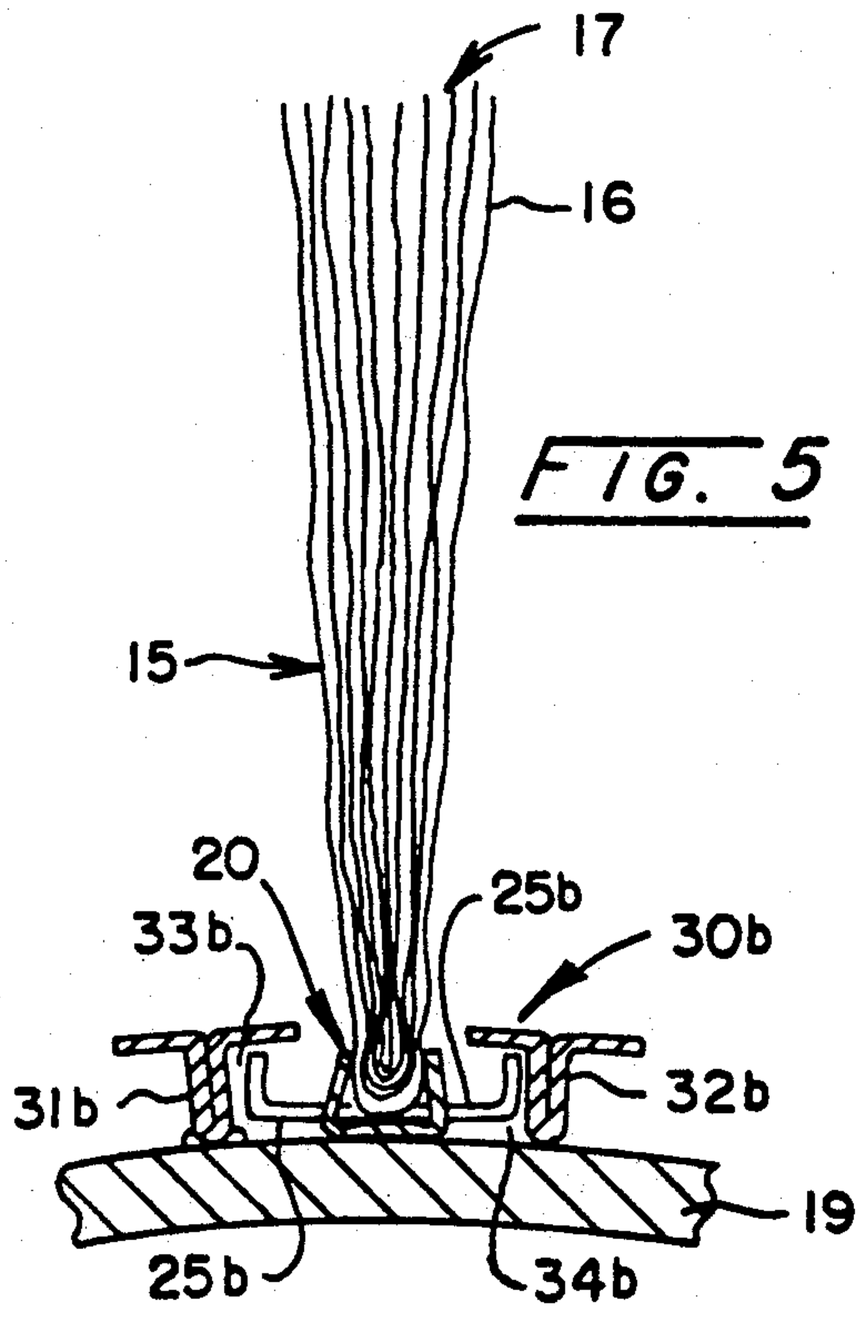


FIG. 5

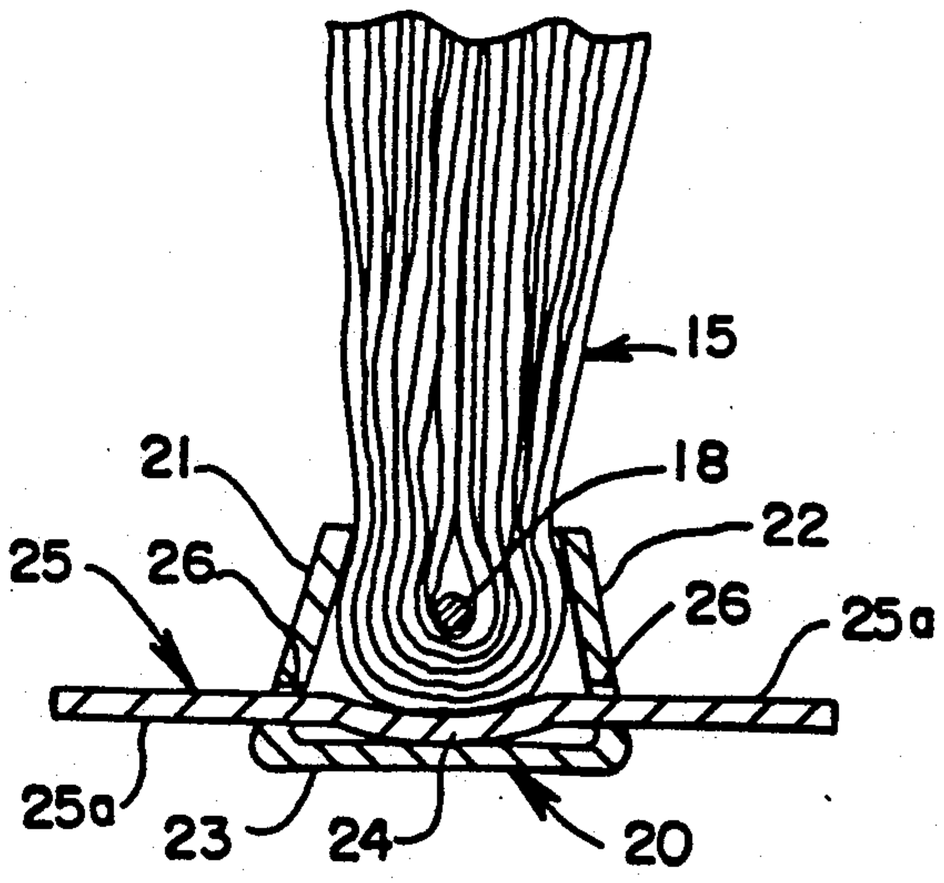
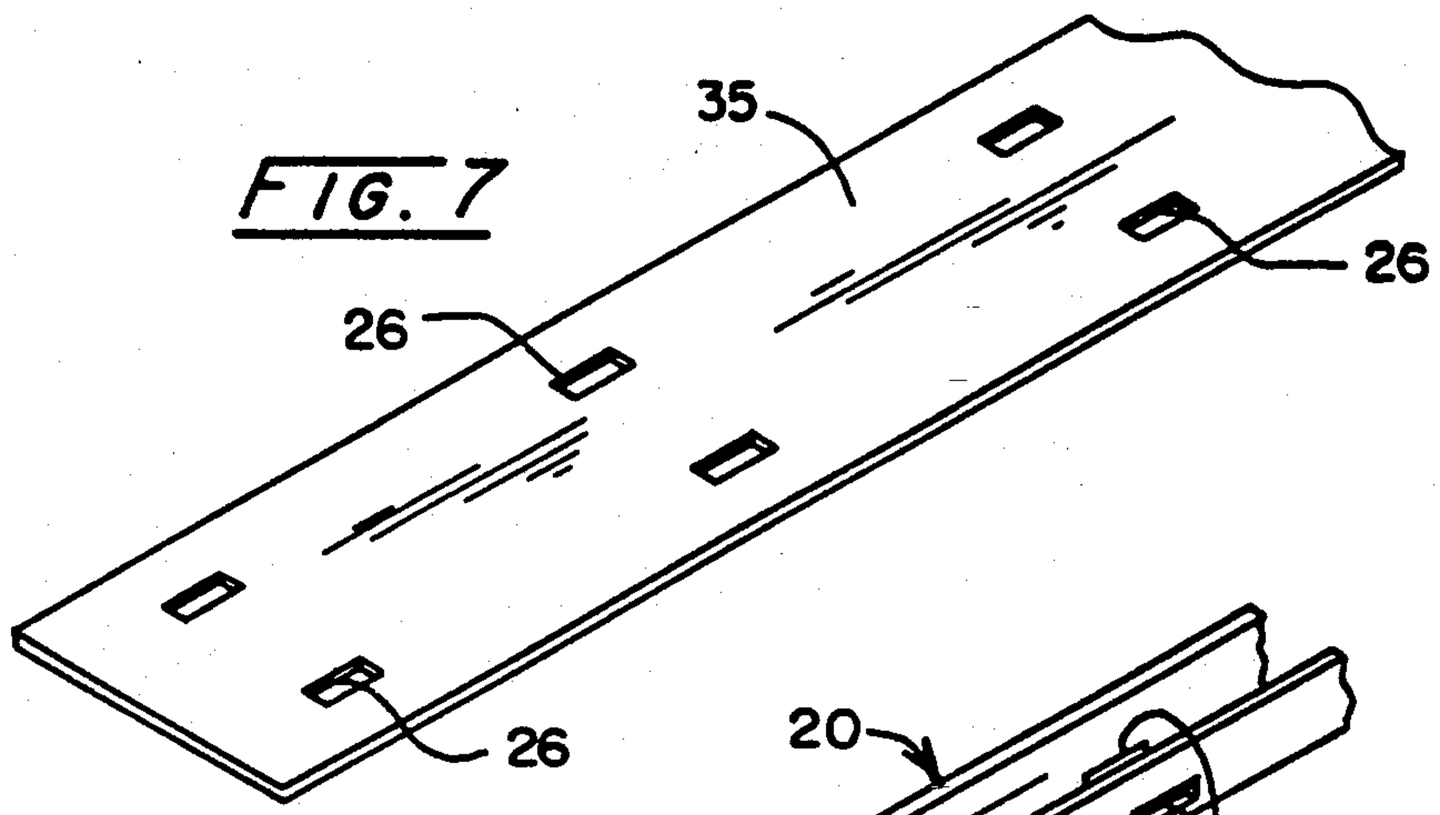


FIG. 6

FIG. 7



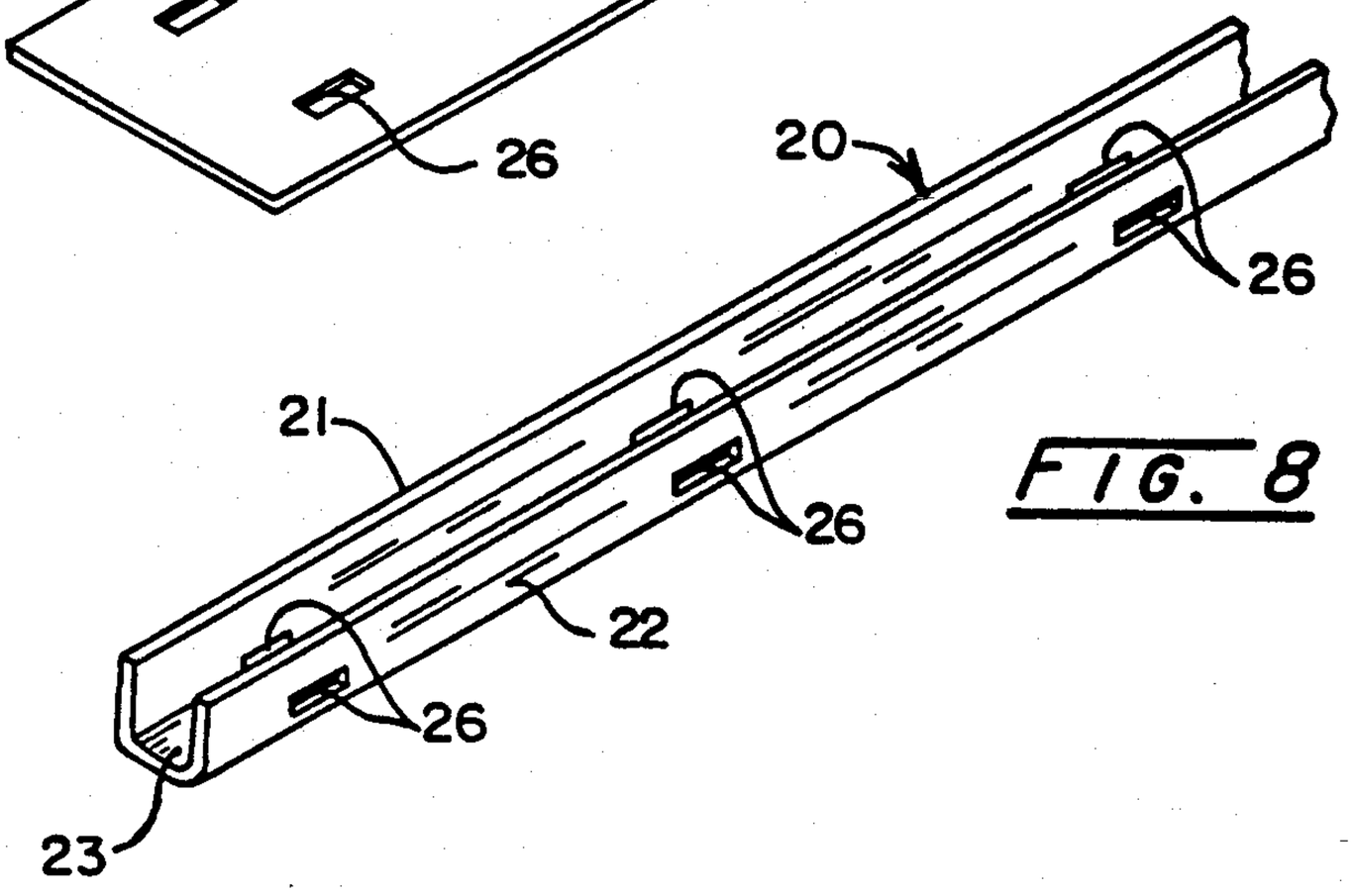
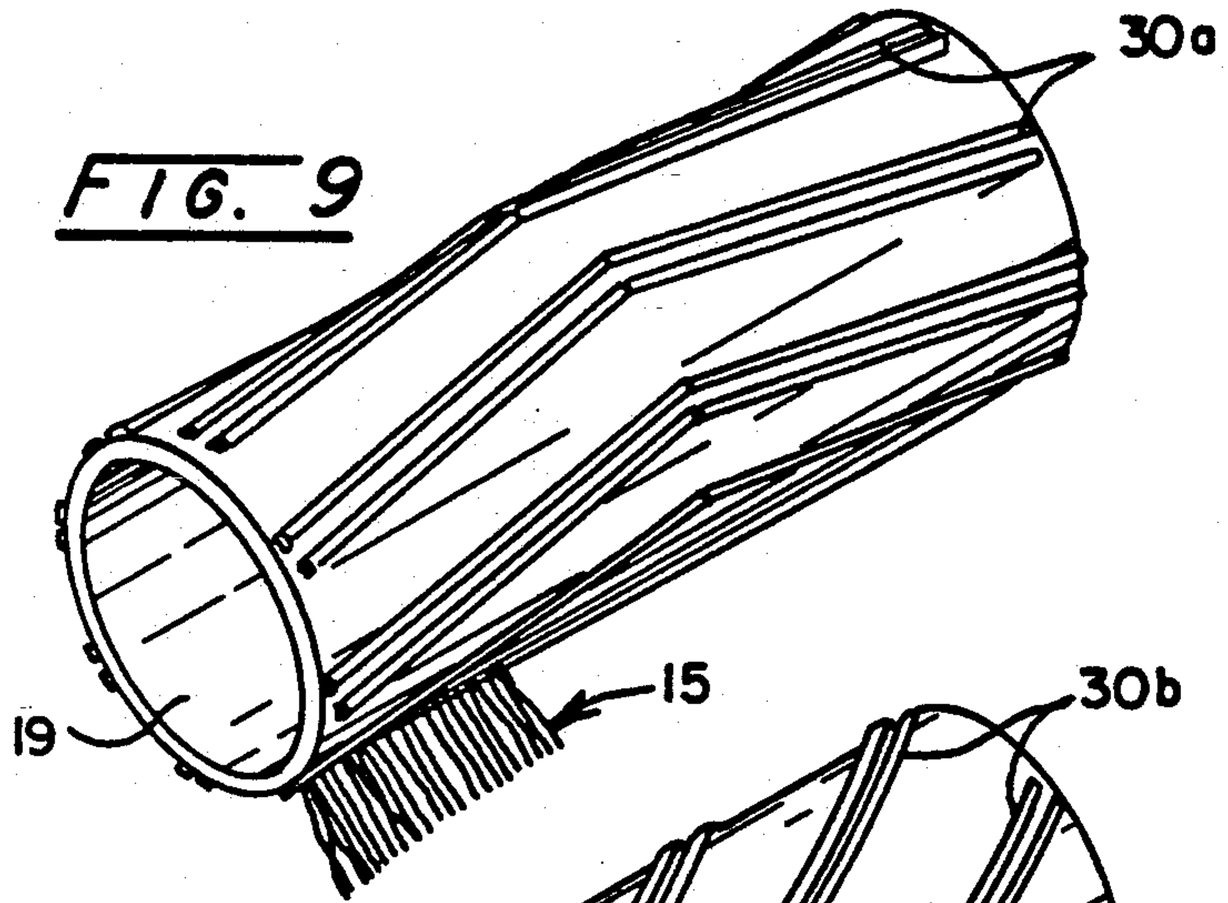


FIG. 8

FIG. 9



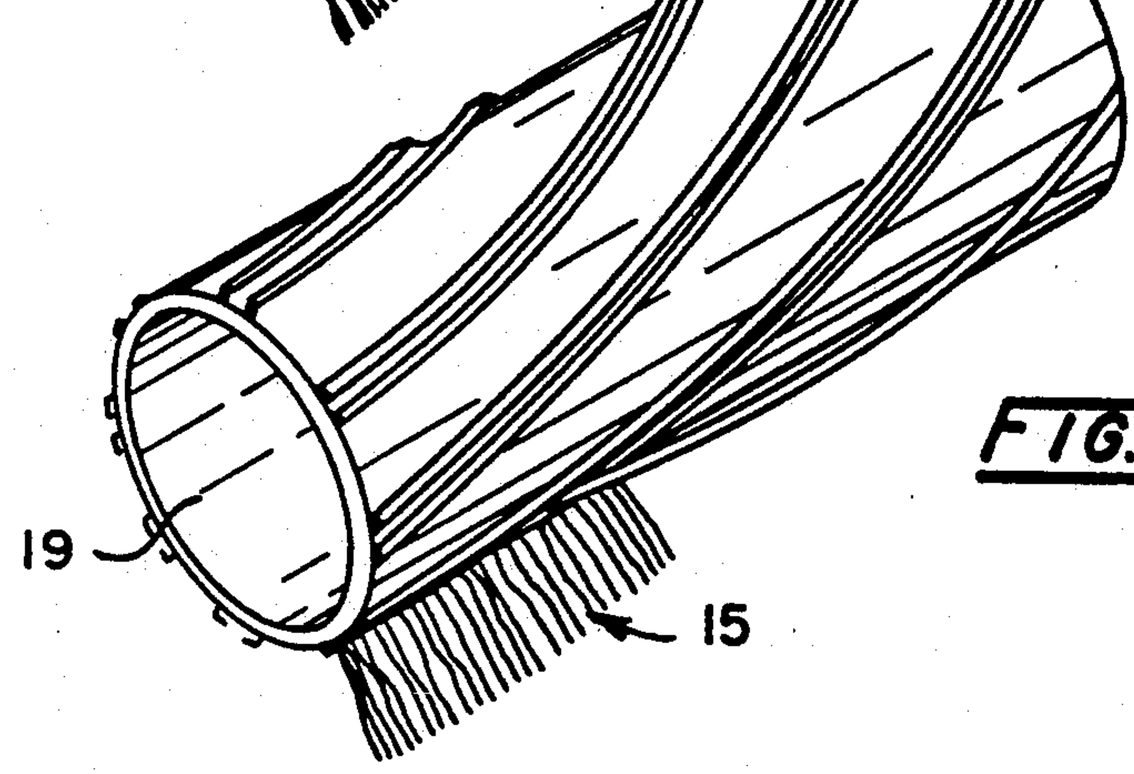
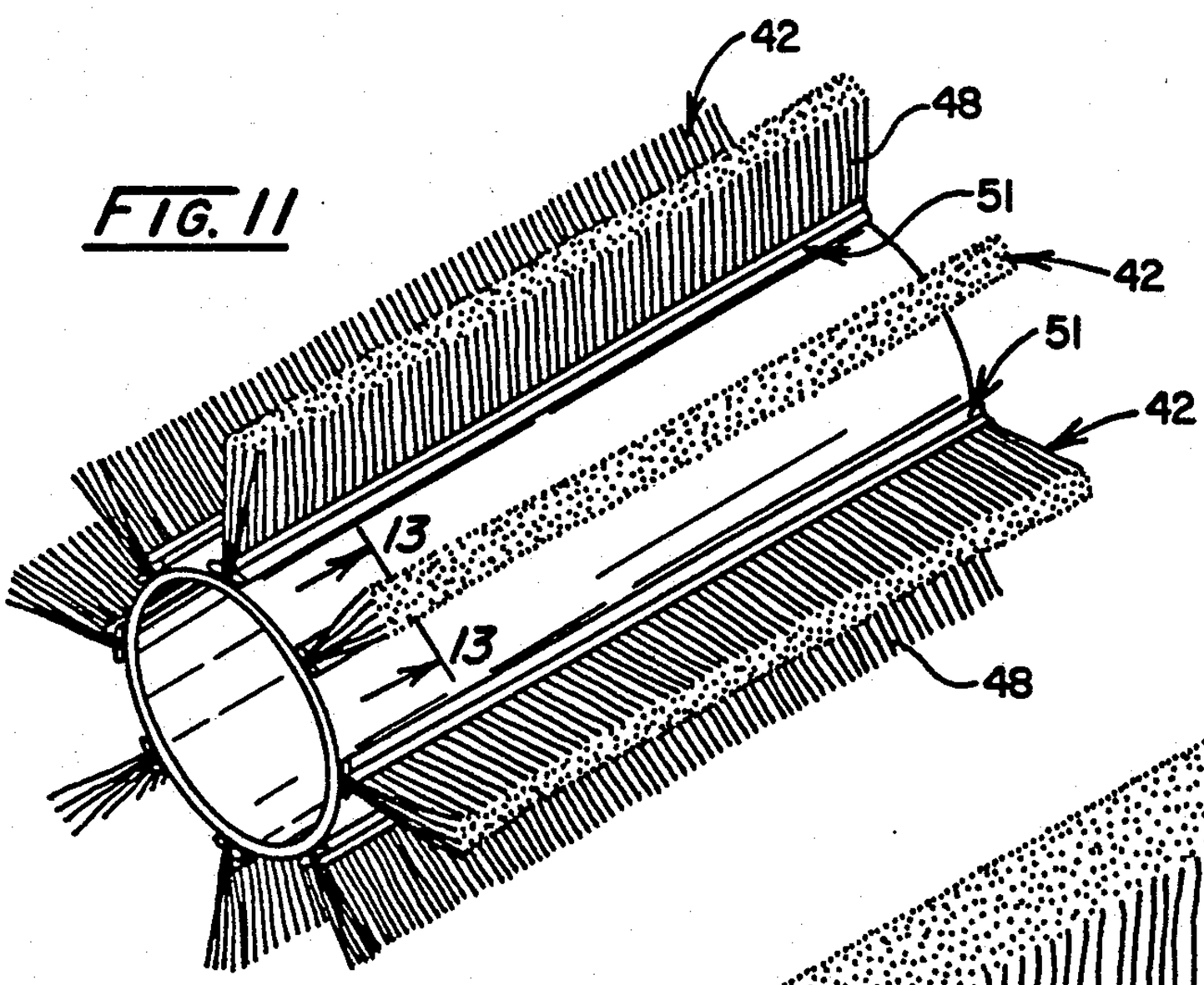


FIG. 10

FIG. 11



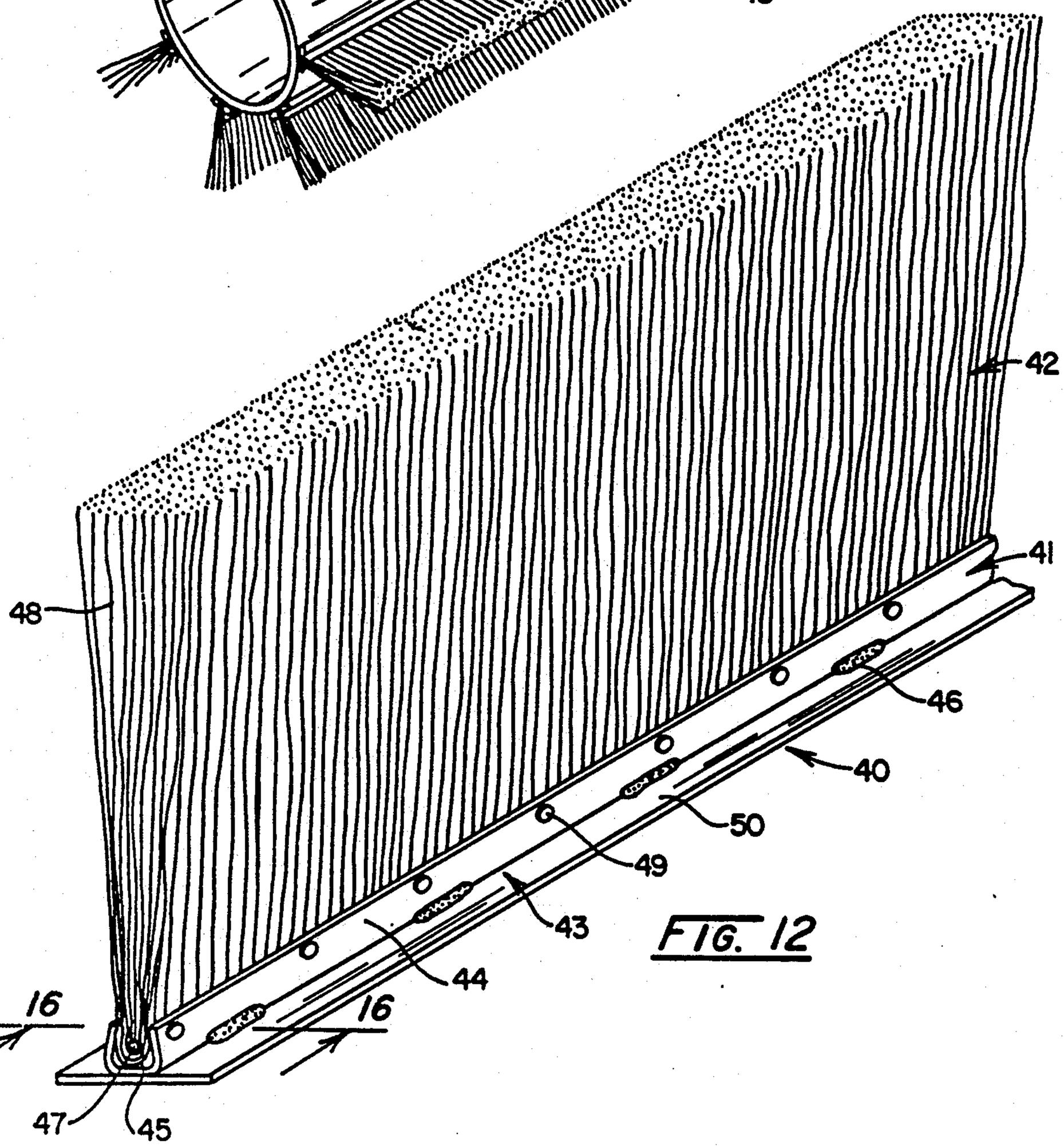


FIG. 12

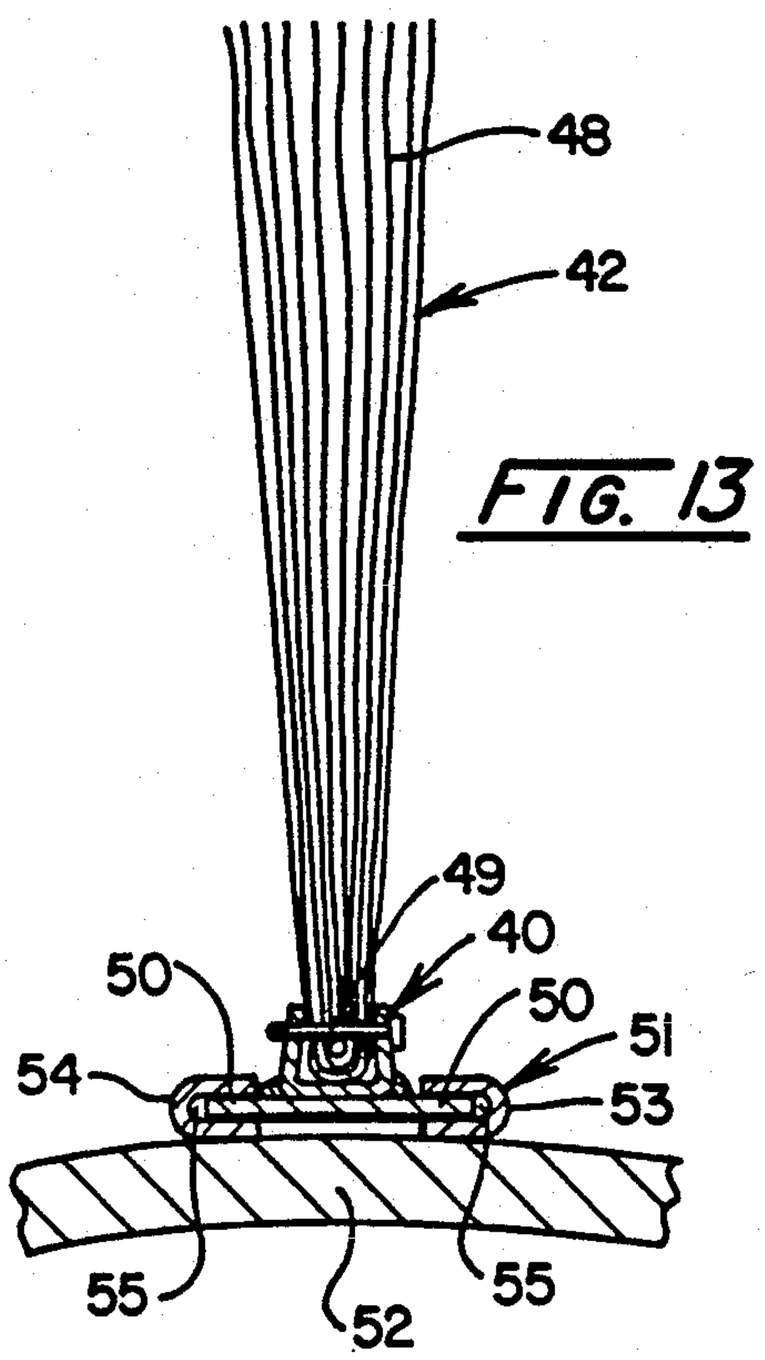


FIG. 13

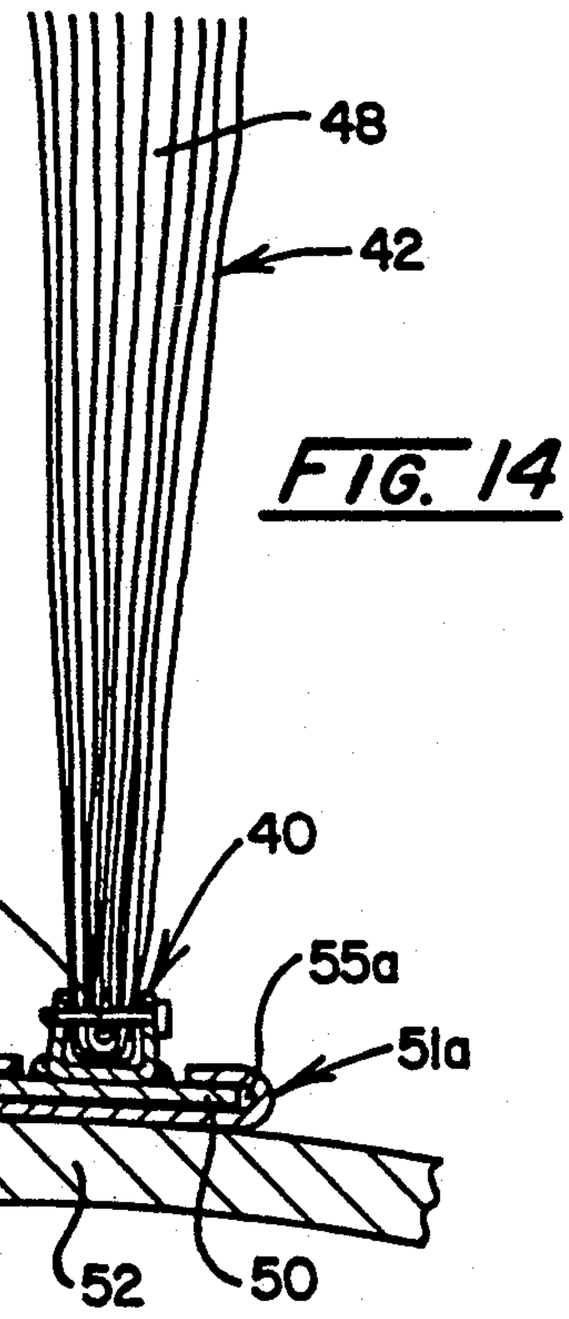


FIG. 14

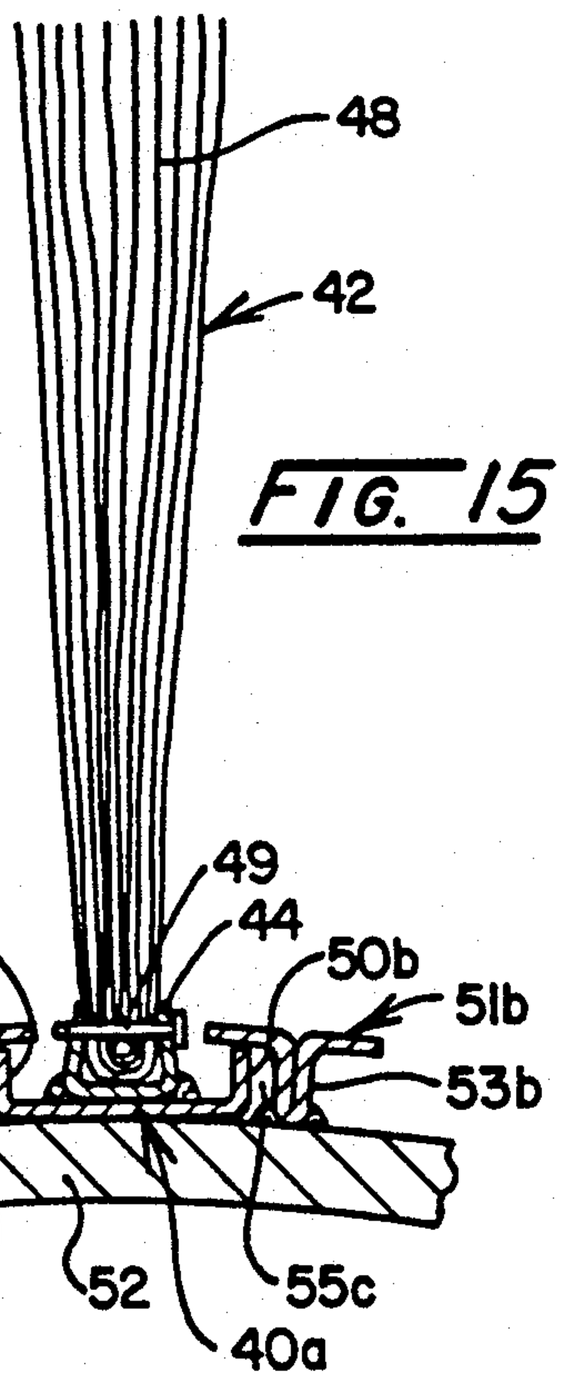


FIG. 15

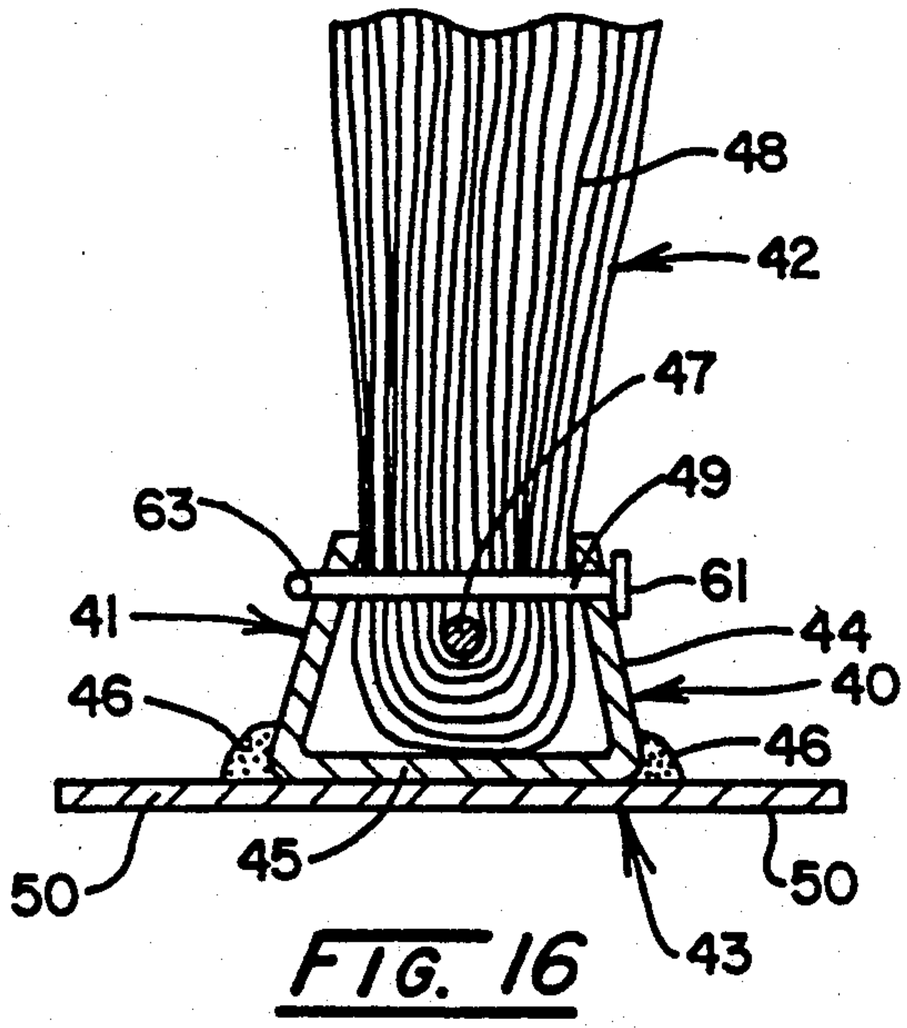


FIG. 16

FIG. 17

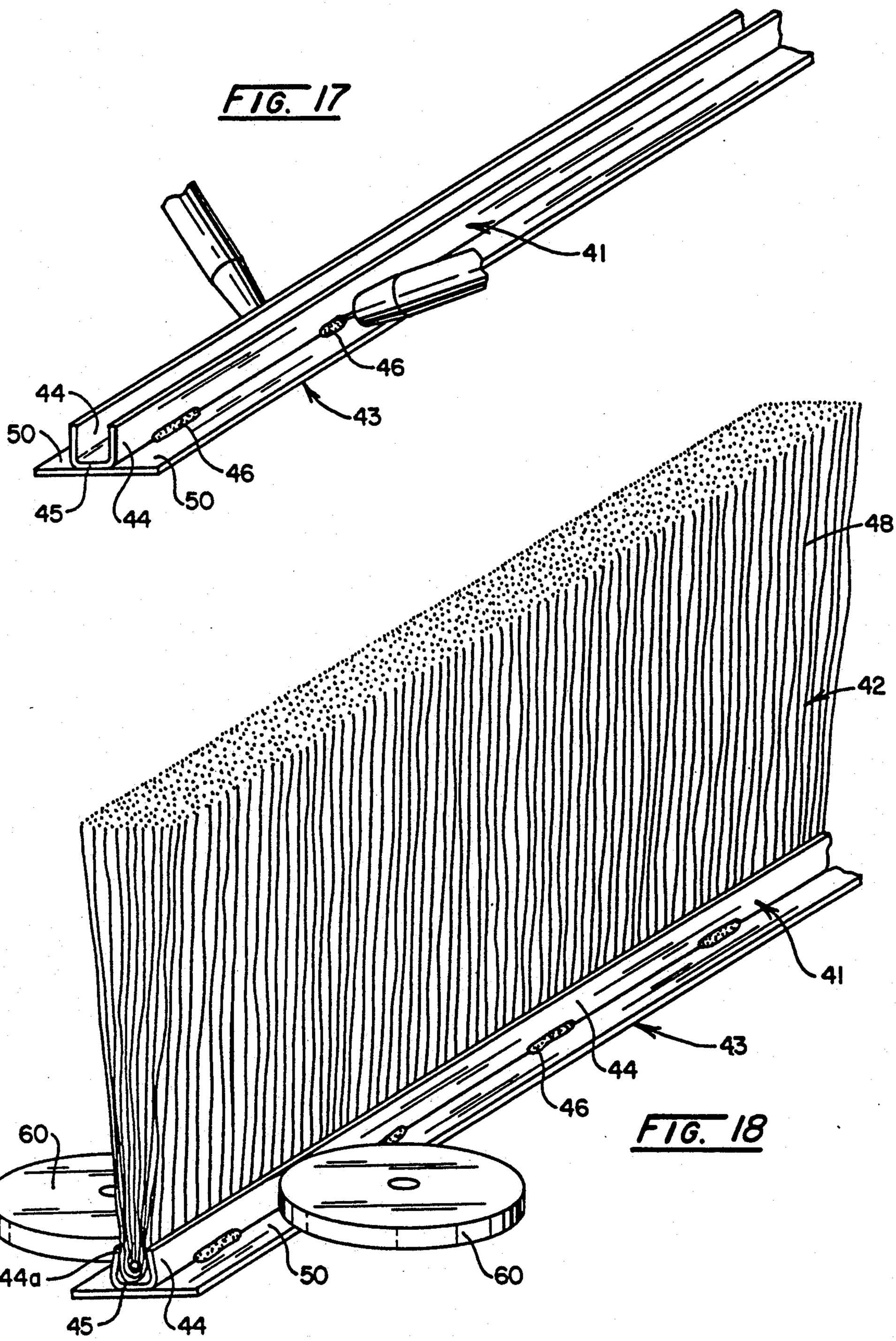


FIG. 18

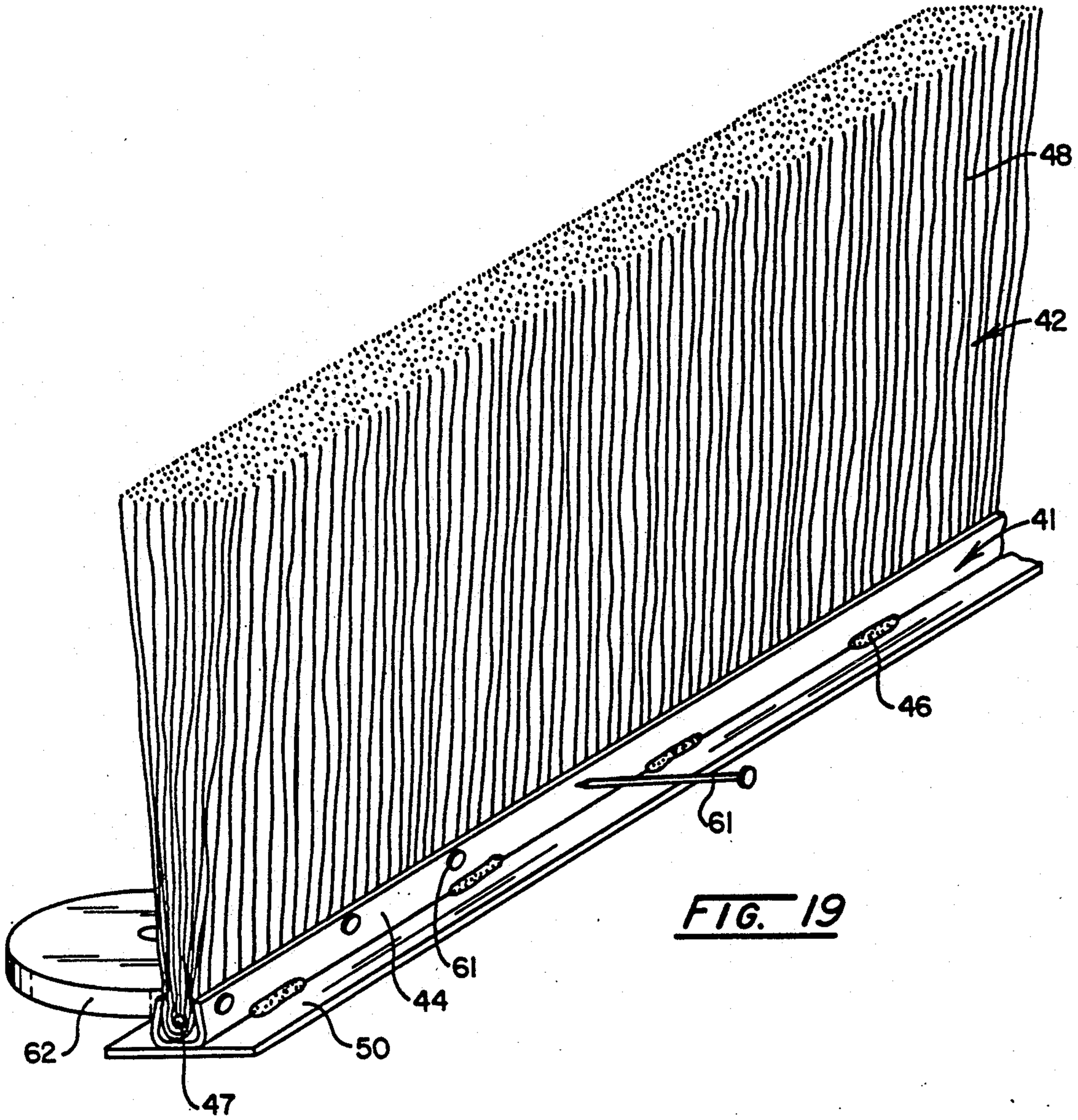


FIG. 19

STRIP BRUSH FOR MOUNTING ON A ROTARY DRUM

This is a continuation-in-part of application Ser. No. 777,905, filed Oct. 17, 1991, now U.S. Pat No. 5,160,187.

FIELD OF THE INVENTION

This invention relates to rotary brushes of the type comprising a drum upon which is mounted strips of bristles. The strips are mounted in tracks on the drum and can be removed for replacement when worn.

BACKGROUND AND PRIOR ART

Rotary brushes now commonly on the market and in use consist of a drum which carries bristle strips on its periphery. The strips are mounted in various ways on the drum and are usually removable so that they can be replaced after wear. It is important that the strip be of such a nature that it can be produced with simple tooling and at a low cost of time and material.

At present a popular brush strip is produced by a slow, costly method of providing a metal strip with holes punched at longitudinally spaced intervals which are to receive the bristles. The closed ends of U-shaped bristles are bunched together and then inserted in these holes; the number of ends must be accurate so that the holes will be filled. The bristles are plastic and are retained in the holes by a heat process. This method of producing bristle strips is limited to plastic bristles and is difficult to perform and time-consuming. It also produces a weak strip that is difficult to handle, the weakness resulting from the successive holes. Due to this weakness, the strip tends to bend at longitudinal intervals from its plane and thus makes it difficult to handle in inserting it into the end of the receiving grooved track or channel on the drum. This track usually has opposed laterally spaced guide grooves for receiving laterally-extending flanges on the bristle strip.

Another method forms a strip for sliding into a track on the drum by double-joining, back-forming, etc. to provide an outwardly-opening, bristle-receiving channel with laterally-extending lower flanges adapted to slip in the laterally-extending grooves of the drum-mounted tracks. This method requires expensive tooling and produces a weak arrangement that results in a leverage problem during rotation of the drum tending to spring apart the flanges of the outwardly-opening bristle-receiving channel and thereby release the bristles.

Many other forms of tracks are provided on drums in the prior art to receive bristle carrying strips. This invention provides a strip which can slip in any guide track that provides laterally-opposed receiving guide grooves which extend longitudinally of the track.

The present invention provides a strip brush for mounting on a rotary drum which is of simple construction and can be removably slipped readily into tracks of the type now usually provided on rotary drums. This bristle strip can be produced without high-cost materials, and expensive tooling and time-consuming operations resulting in a low cost strip. It can be inserted readily in the drum track, will be effectively retained therein and can be removed with ease when it is necessary to replace it. The bristle strip is stronger and easier to install and remove as compared to prior art strips and as indicated above is less costly to produce.

SUMMARY OF THE INVENTION

The bristle strip of this invention is of channel form and receives a mat of bristles of U-form having a retaining wire running through the U ends of the mat bristles as in the prior art. This mat of bristles is retained in the carrying channel by crimping of the sides or flanges of the channel. The channel is provided with guide means for fitting into the drum-carried track in the form of laterally-extending guide members which project laterally outwardly beyond the upstanding flanges of the channel. These guide members will slip directly into the laterally-opposed continuous receiving guide grooves of the drum mounted track.

In one form of the invention for mounting in the drum-carried track the upstanding sides or flanges of the channel are provided with pairs of opposed slots which receive guide members in the form of lugs that project laterally from each side or flange of the outwardly extending sides or flanges of the channel. These laterally-projecting guide lugs provide guide ears which will project slidably into the laterally-opposed guide grooves of the track. This form of the bristle strip can be economically produced from a flat strip of metal which is perforated to provide the holes in the channel which is subsequently formed from the flat strip by a simple bending operation.

In another form of the invention the bristle mat-carrying channel is secured directly, such as by welding, to a guide strip which is co-extensive with the mat-carrying channel. This strip is wider than the channel and extends laterally outwardly therefrom to provide longitudinally continuous guide members in the form of continuous flanges which are adapted to slip into the laterally-opposed continuous guide grooves of the track of the drum.

BRIEF DESCRIPTION OF THE DRAWINGS

The best mode contemplated in carrying out this invention is illustrated in the accompanying drawings in which:

FIG. **1** is a perspective view of a drum having bristle strips of this invention mounted thereon in straight parallel angularly spaced relationship;

FIG. **2** is an enlarged perspective view of the bristle strip of one form of this invention;

FIG. **3** is an enlarged transverse sectional view taken along line **3—3** of FIG. **1** having one type of drum track into which the bristle strip of this invention is slipped;

FIG. **4** is a similar view showing a different form of track with the bristle strip of this invention inserted;

FIG. **5** is a similar view showing the bristle strip inserted into a different form of track;

FIG. **6** is an enlarged transverse sectional view taken along line, **6—6** of FIG. **2**;

FIG. **7** shows a flat strip which can be used in forming the channel that carries the bristles;

FIG. **8** shows the channel after it is formed from the flat strip;

FIG. **9** shows a herringbone arrangement of the strips on a drum;

FIG. **10** shows the strips on the drum extending helically of the drum;

FIG. **11** is a view similar to FIG. **1** but showing another form of the bristle strip of this invention on the drum;

FIG. **12** is an enlarged perspective view of the bristle strip carried by the drum in FIG. **11**;

FIG. 13 is an enlarged transverse sectional view taken along line 13—13 of FIG. 11 showing one type of drum track into which this form of the bristle strip is slipped;

FIG. 14 is a similar view showing a different form of track with this form of the bristle strip inserted;

FIG. 15 is a similar view showing the bristle strip mounted into a different form of track;

FIG. 16 is an enlarged transverse sectional view taken along line 16—16 of FIG. 12;

FIG. 17 is a perspective view indicating a step in the making of this form of bristle strip before the bristle mat is inserted in the channel which will carry it;

FIG. 18 is a perspective view indicating another step in the making of the bristle strip after the bristle mat is inserted in the channel; and

FIG. 19 is a similar perspective view showing the final step of the method.

DETAILED DESCRIPTION OF THE INVENTION

With reference to the drawings, the bristle strip of this invention is shown in detail in the drawings and is designated generally by the number 15. Each strip consists of the bristle receiving and carrying channel 20 into which the U-form bristles 16 of the mat of bristles designated generally at 17 are inserted. A retaining wire 18 passes longitudinally through the closed lower ends of the bristles 16 to retain them in the channel 20 which in its final form has the parallel upstanding sides or flanges 21 and 22 that are crimped into contact with the spaced sides of the bristle mat 17 outwardly of the wire 18. The mat 17 may be formed of U-shaped flexible bristles 16 which are of metal, plastic or other suitable material with their open upper ends projecting from channel 20. At longitudinally spaced intervals guide lugs 25 are passed through opposed slots 26 in the walls 21 and 22 of the channel 20 just above the bottom wall 23 of the channel. The projecting ends of the lugs 25 provide guide ears 25*a* which will extend into the opposed guide grooves of the drum-mounted tracks 30 (FIG. 1) as will be explained later. Each lug 25 is provided with a curved depression or indentation 24 midway of its length to hold it in a fixed position laterally of the channel 20 when the bristle mat 17 is inserted in that channel and is crimped into engagement with the mat (FIG. 6). This causes the curved lower ends of the bristles 16 to be forced downwardly into the curved indentations 24 to lock the lugs in fixed lateral positions as shown in FIG. 6. Each indentation 24 is formed transversely in each lug 25 to provide a transverse groove for receiving the lower curved end of the mat 17. The curved lower side of the indentation 24 forms a boss which will contact the bottom 23 of the channel 20.

An alternative embodiment, not illustrated, may include two parallel channels 20 with their edges abutting. The lug 25 is longer than illustrated in FIG. 6 to extend through aligned slots 26 in both juxtaposed channels. The resulting strip is somewhat stiffer and the radially projecting bristles are more dense at the periphery of the brush unit.

One form of track is indicated at 30 in FIG. 1 where several of the tracks are shown on the drum 19 in straight angularly spaced positions where they may be welded or otherwise secured to the drum as indicated in FIG. 3. The track 30 in this instance is composed of U-shaped metal sections 31 and 32 secured around the drum in parallel spaced positions to form the opposed inwardly opening guide grooves 33 and 34 which will receive the ears 25. The track sections 31 and 32 may be of metal or plastic and be secured to the drum by various means.

FIG. 4 shows another form of track 30*a* which is shaped to provide the laterally-opposed guide grooves 33*a* and 34*a* for receiving the guide ears 25*a* of the bristle strip 20. The track is welded or otherwise secured to the drum 30.

In FIG. 5 a different form of prior art track 30*b* may be provided on the drum 30. This provides the guide grooves 33*a* and 34*a* by welding to the drum 30 inverted T-shaped strips 31*a* and 32*a*. In this instance the ends of the lug ears 25*b* are bent upwardly after insertion so as to fit snugly in the respective grooves 33*b* and 34*b*.

The bristle strip 15 of this invention will slide into any track on the drum or other object which has the spaced laterally-opposed guide grooves that provide a socket for receiving the channel 20 of the bristle strip 15 and the opposed inwardly-opening guide grooves which will receive the opposed guide ears extending from the strip. In each case inserting and crimping the mat 17 of bristles in the channel 20 will press the lower curved end of the bristles 16 into indentations 24 to lock the guide lugs 25 laterally in position in the channel so that guide ears 25*a* will project.

As indicated the bristle strips 15 may be positioned on the drum 19 in various arrangements depending upon the arrangement of the guide tracks on the drum. In FIG. 1 the strips 15 are of straight form and are inserted in the straight angularly spaced guide tracks 30. The strips will be sufficiently strong to facilitate this insertion. In FIG. 9 the tracks 30*a* are arranged on the drum in a herringbone relationship. In FIG. 10, the tracks 30*b* are arranged in a curved helical pattern on the drum 19. The strips 15 are relatively stiff to permit the straight insertion into the tracks 30 and 30*a* but are capable of being twisted about their longitudinal axes for inserting them into the curved tracks 30*b* and for bending in the herringbone pattern 30*a* of FIG. 9.

As indicated, the bristle strip 15 is of such a nature that it can be produced by a simple low-cost method which is illustrated in FIGS. 7 and 8. It is produced from a flat elongated strip of metal 35 by a stamping or other operation which forms two parallel rows of slots 26. These slots are arranged as laterally-opposed pairs at longitudinally spaced intervals. The strip 35 is then formed into the channel 20 by forming rolls or other forming means. This positions the slots 26 of each pair directly opposite each other in the respective upstanding flanges 21 and 22 of the channel. Also, it will be noted that these slots are located just above the bottom 23 of the channel. Thus, the channel 20 with the slots 26 formed therein can be produced by a simple low-cost method which does not require expensive tooling.

It will be apparent that the bristle strip of this form of the invention is a simple structure in the form of a single channel which receives the bristle mat that is retained therein by crimping the sides of the channel. At longitudinal intervals the channel side walls are provided with slots for receiving guide lugs which project laterally and will fit into most drum tracks now in use. These lugs are held in fixed lateral position by a locking means which functions when the mat of bristles is positioned in the channel. The nature of the bristle strip permits production at a very low cost without special tools.

FIGS. 11 to 19 indicate a different form of bristle strip and method of making it according to this inven-

tion. The bristle strip is designated generally by the number **40**. The completed strip as shown in FIGS. **12** and **16** consists of the bristle-receiving and carrying channel **41** that carries the mat of bristles **42** and the co-extensive guide strip **43** secured directly to the channel. The channel is of U-form with the upstanding parallel flanges **44** and the bottom **45**. The channel **41** is secured to the flat guide strip **43** on which its bottom **45** rests by longitudinally spaced opposed welds **46** which are in opposite pairs. The welds are at the lower corners of the channel **41**. They could be continuous. The mat of bristles **42** has a retaining wire **47** passing longitudinally through the closed ends of the U-shaped bristles **48** to retain them in the channel **41**. In FIG. **12** bristle retaining members in the form of nails **49** are shown passed through the upstanding flanges **44** and through the upstanding bristles of the mat **42** above the retaining wire **47** to aid in holding the bristles of the mat in the channel **41**. The guide strip **43** thus provides laterally-opposed guide members which are co-extensive with the channel **41** carried thereby and which extend in opposite directions laterally beyond the upstanding flanges **44** of the channel which is centered on the strip. These guide members are in the form of guide flanges **50** which are adapted to slip directly in the laterally-opposed guide grooves of a drum mounted track.

One form of track for receiving a bristle strip is indicated in FIG. **13** and is designated generally by the numeral **51**. A series of these tracks are shown mounted on a drum **52** in straight angularly spaced positions where they may be welded or otherwise secured to the drum as shown in FIG. **11**. The track **51** in this instance is composed of U-shaped metal sections **53** and **54** secured around the drum in parallel spaced positions to form the opposed inwardly opening guide grooves **55** and **56** which will receive the strip guide flanges **50** as the strip is mounted in the drum as shown in FIG. **13**.

FIG. **14** shows another form of track **51***a* which is shaped to provide the laterally-opposed guide grooves **55***a* and **56***a* for receiving the guide flanges **50** of the bristle strip **40**. The track **51***a* is welded or otherwise secured to the drum.

In FIG. **15** a different form of track **51***b* may be provided on the drum **52** for receiving the slightly modified bristle strip **40***a*. The guide grooves **55***a* and **56***a* are provided by welding to the drum inverted T-shaped strips **53***b* and **54***b* to provide the laterally-opposed grooves **55***b* and **56***b*. In this instance the edges of the guide strip **43***b* will be bent upwardly so that the strip is of channel form and includes upstanding guide lips **50***b*. The strip **43***b* preferably has the upstanding guide lips **50***b* formed thereon before it is welded to the channel **41** that later receives the bristle mat **42**.

This form of the bristle strip **40**—**40***b* is of such a nature that it also can be produced by a simple low cost method. This method is illustrated in FIGS. **17**, **18** and **19**. In FIG. **17** there is shown the guide strip **43** with the longitudinally co-extensive bristle mat receiving channel **41** welded thereto by the welds **46** located at the lower corners of the upstanding channel flanges **44**. The bottom **45** of the channel is in flat contact with the upper surface of the guide strip **43** as shown. The upstanding flanges **44** are spaced apart to receive the lower end of the bristle mat **42**.

The next steps of the method are illustrated in FIG. **18**. The mat **42** with the wire **47** positioned therein is then positioned in the channel **41** by inserting its lower edge, having the closed ends of the bristles **48**, resting on the flat bottom **45** of the channel and between the upstanding flanges **44** thereof. The upstanding flanges **44** are then crimped inwardly by crimping rollers **60** which engage the upstanding flanges **44** at opposite sides. This holds the mat **42** firmly in the channel **41** that is attached to the upper surface of strip **43** by welds **46** as previously described. Welding before inserting the mat **42** of bristles is especially important if the bristles are of plastic so they will not be melted. However, the mat **42** could be inserted in and crimped in the channel **44** and then the channel could be welded to the guide strip **43**. It will be noted from FIG. **16** that the crimped flanges **44** engage the mat at their upper edges **44***a* above the wire **47** as shown in FIGS. **16** and **18**. Thus, this form of the invention provides a brush strip which consists of only three main elements, the bristle mat **42**, the mat receiving channel **41** and the guide strip **43**, the latter two being secured together by the welds **46**. The bristle strip **40** can be slipped readily into the end of any drum track which provides laterally-opposed grooves for receiving the guide flanges **50** which prevent radial outward movement during rotation of the drum **52**. The bristle mat **42** will be secured in the channel **41** during this rotation by the crimped sides **44** of the channel **41**.

Instead of crimping the sides **44** of the channel **41** as described, they may be crimped as shown in FIG. **5** of U.S. Pat. No. 4,498,210.

For rough usage, such as sweeping brick streets, it may be desirable to use the arrangement illustrated in FIG. **19**. This comprises the use of mat retaining nails **61** which are passed transversely through the flanges **44** of the channel **41** and through the bristle mat **42** by means of a suitable nail gun. These nails are shot through the assembly above the mat wire **47** as indicated in FIG. **16** with their pointed ends projecting beyond the opposite flanges **44** and are subsequently bent over against the adjacent flange **44** by a roller **62**, the bent ends being shown at **63** in FIG. **16** in engagement with the adjacent flange while the heads thereof engage the opposite flange. The nails may be disposed at suitably longitudinally spaced intervals. The nails **61** passing through the flanges **44** and the mat **42** above the wire **47** (FIG. **16**) will firmly hold the mat in the channel **41**.

The bristle strip **40** may be positioned in tracks on the drum in various arrangements such as those shown in FIGS. **9** and **11**.

It will be apparent from the above description that the bristle strip of this invention is a simple structure which can be produced by a simple low cost method which does not require expensive tooling. The bristle strip assembly comprises a supporting channel having spaced upstanding flanges in which the bristle mat is clamped and track-guide and retaining means carried by the channel in the form of laterally-extending guide and retaining members which project laterally outwardly beyond the upstanding flanges of the channel and are adapted to be slipped into laterally-opposed grooves in a drum track.

Although the bristle strip of this invention was intended for use mainly on rotary drums, it could be used for other applications.

I claim:

1. A bristle strip comprising a supporting channel having spaced side flanges upstanding from a bottom,

a mat of U-shaped flexible bristle having a closed curved lower end, an open upper end and spaced sides, the closed lower end being positioned between said upstanding flanges,

said mat having a continuous retaining wire extending through the closed end of the bristles, said flanges being crimped into engagement with the sides of the mat above the retaining wire to clamp the mat and thereby hold it in the channel,

laterally-extending guide members carried directly on said supporting channel which project laterally outwardly beyond said upstanding flanges thereof to serve as guide and retaining members which can be slipped into opposed grooves in a drum mounted track, said guide members being in the form of laterally-extending lugs carried at longitudinally spaced intervals on said supporting channel mounted on said channel in pairs of opposed slots formed in the side flanges of said channel and above the bottom thereof in engagement with the closed end of the said mat below said retaining wire and projecting laterally from each side flange of the channel to provide projecting guide ears,

each lug being provided with retaining means engaged by the lower closed end of the U-shaped bristles to hold it in a fixed lateral position with the ears projecting from the channel.

2. A bristle strip according to claim 1 in which said mat of bristles has bristles with closed curved lower ends, said retaining means of each guide lug comprising a curved indentation for receiving said curved lower ends of the bristles when they are clamped in said channel.

3. A bristle strip comprising a supporting channel having spaced side flanges upstanding from a bottom,

a mat of U-shaped flexible bristles having a closed curved lower end, an open upper end and spaced sides, the closed lower end being positioned between said upstanding flanges,

said mat having a continuous retaining wire extending through the closed ends of the bristles, said flanges being crimped into engagement with the sides of the mat above the retaining wire to clamp the mat and thereby hold it in the channel,

laterally-extending guide members carried directly on said supporting channel which project laterally outwardly beyond said upstanding flanges thereof to serve as guide and retaining members which can be slipped into opposed grooves in a drum mounted track, said guide members being in the form of laterally-extending lugs carried at longitudinally spaced intervals on said supporting channel mounted on said channel in pairs of opposed slots formed in the side flanges of said channel and above the bottom thereof in engagement with the closed end of the said mat below said retaining wire and projecting laterally from each side flange of the channel to provide projecting guide ears,

each lug being provided with retaining means engaged by the lower closed end of the U-shaped bristles to hold it in a fixed lateral position with the ears projecting from the channel, said retaining means of each guide lug comprising a curved indentation for receiving said curved lower end of the bristles when they are clamped in said channel, said curved indentation being formed transversely of the lug and providing a boss in contact with the bottom of the channel.

4. A bristle strip comprising a longitudinally extending substantially flat guide strip of substantial width having laterally opposed edges, a bristle mat supporting channel having spaced side flanges upstanding from a substantially flat bottom, a mat of U-shaped flexible bristles having a closed lower end, an open upper end and spaced sides, the closed lower end of said mat being positioned between said upstanding flanges, said mat having a retaining wire extending continuously through the closed end of the bristles, said flanges being crimped into engagement with the sides of the mat above the retaining wire to clamp the mat and thereby hold it in the channel, said supporting channel being coextensive with the flat guide strip and being superimposed thereon with its flat bottom in contact with the flat guide strip, said guide strip being substantially wider than said supporting channel and said channel being secured thereon in a fixed position intermediate said opposed lateral edges of said strip so as to provide opposed laterally outwardly extending continuous track guide flanges which extend beyond the side flanges of said mat supporting channels.

5. A bristle strip according to claim 4 in which the guide strip is secured to the bristle mat support channel by welds at the junction of said flanges and said flat bottom of said channel, and mat retaining means passed transversely through said upstanding flanges of said support channel above said wire to aid in keeping the mat in said channel.

6. A bristle strip according to claim 5 in which said retaining means comprises nails passed transversely through said flanges of said channel and through the lower closed end of said bristle mat clamped therein above said retaining wire in said mat.

7. A bristle strip according to claim 6 in which the nails have a head engaging the outer surface of one channel flange and bent over ends engaging the outer surface of the outer channel flange.

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